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27JAN00 E508236-1 C23535
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Request for grant of a patent

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1. Your reference — MOBILE COMMUNICATION SYSTEM

2. Patent application number *(The Patent Office will fill in this part)* — **0001754.1** — 27 JAN 2000

3. Full name, address and postcode of the or of each applicant *(underline all surnames)* — MR PHILLIP JARRETT, 74, ADELAIDE ROAD, BRAMHALL, CHESHIRE SK7 1LU

   Patents ADP number *(if you know it)* 35769070 01

   If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention — MOBILE COMMUNICATION SYSTEM

5. Name of your agent *(if you have one)*

   "Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)* — AS ABOVE

   Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
   a) any applicant named in part 3 is not an inventor, or
   b) there is an inventor who is not named as an applicant, or
   c) any named applicant is a corporate body.
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Continuation sheets of this form	
Description	6 SHEETS
Claim(s)	—
Abstract	—
Drawing(s)	~~4~~ 4 SHEETS (FIGS 1-5)

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature P Jarrett Date 25th JAN 2000

12. Name and daytime telephone number of person to contact in the United Kingdom PHIL JARRETT 0161-440 9269

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MOBILE COMMUNICATION SYSTEM

The present invention relates to means for connecting a cordless phone to a cellular phone network via a mobile transponder unit, as an alternative to using a mobile phone.

A typical mobile phone comprises a handset housing the antenna, speaker and microphone, control pad and visual display, along with the necessary internal electronic circuits, powered by a rechargeable battery. In other words, all of the components necessary to communicate voice/sound, data and/or visual image signals with the local base station within a cellular network are integrated into a single mobile hand-held product. Depending on the local network geography, the nearest fixed base station may be located some kilometres away from the mobile phone, so the antenna typically has to transmit a high powered signal for the phone to communicate.

Although the scientific research carried out to date tends to be inconclusive, there is a growing body of anecdotal evidence which suggests there may be health risks associated with the use of mobile phones. It is alleged that radiation emitted by the mobile phone is absorbed by the user's body and can result in biological damage, particularly to the head.

Given the main source of radiation is the antenna, various approaches to aerial shielding have been devised and there are some proprietary products available. Although these shields are able to substantially reduce the radiation absorbed by the user's head, they can also cause some degree of signal attenuation which may impair reception.

Another method of reducing radiation to the head involves the use of a hands free kit where, for example, a lapel clip microphone and associated earpiece are connected to the mobile phone via a length of cable. A more recently developed product comprises a hands free microphone headset communicating with the mobile phone via a near range radio link instead of a cable. The hands free approach is thought to reduce the net radiation to the head but the mobile phone has to be kept within accessible arms reach of the user, in order to make and receive calls. In view of this, the user often keeps the phone in a pocket, or, in a case clipped to a belt or similar. As a result of this close contact with the mobile phone, at least some part of the body will be subjected to radiation from the high powered antenna, even in standby mode.

The present invention interposes a mobile transponder unit between a cordless phone and a local cellular network base station. Due to its much shorter range, the radiation emitted by a cordless phone antenna is typically 10-20% of the radiation emitted by a mobile phone antenna. For example, a cordless phone can have an adequate range measured in tens of metres; whereas, a mobile phone communicating within a public cellular network, needs to be capable of transmitting up to several kilometres. The described mobile communication system thus results in a very substantial reduction in radiation local to the user's head during normal voice communication.

Unlike the requirements of a typical hands free kit, direct user access to the transponder unit is not required, in order to make or receive calls. In view of this, the mobile transponder unit can be stored away in say a hand bag, or, briefcase, so that it is not in close contact with the body; when used in the home or office, the transponder unit can be located some metres away in a quiet unfrequented area. Used in this way, there is no need to fit the mobile transponder unit with a shield for its high powered antenna.

Some specific embodiments of the present invention will now be described, as examples, with reference to the accompanying drawings:-

Fig 1 shows the block diagram of one embodiment of the mobile communication system;

Fig 2 shows the block diagram of one embodiment of a mobile transponder unit, forming part of the mobile communication system shown in Fig 1;

Fig 3 shows the external plan view of one embodiment of a mobile transponder unit;

Fig 4 shows the external end view of the mobile transponder unit shown in Fig 3;

Fig 5 is the external side view of the mobile transponder unit shown in Fig 3, except with the hinged antenna rotated through 90 degrees.

Referring to Fig 1, a cordless phone 1 transmits and receives via internal antenna 2, passing low powered signals 3 to and from the mobile transponder unit 5 via internal antenna 4.

On the other hand, the mobile transponder unit 5 communicates with the cellular network's local base station 8 via external antenna 6, transmitting and receiving the high powered signals 7.

The phone 1 and transponder 5 make use of existing cordless and mobile phone technology, each powered by their respective rechargeable battery packs. For example, phone 1 uses technology based on the DECT cordless phone standard to communicate with transponder 5. On the other hand, the transponder 5 incorporates technology based on the widely used GSM mobile phone standard to communicate with the base station 8. In Europe, public GSM networks make use of the 900 MHz and/or 1800 MHz frequency bands; whereas, in North America, the 1900 MHz frequency band is employed.

In an alternative embodiment (not shown) to the mobile communication system described with reference to Fig 1, the cordless phone 1 receives signals directly from the base station 8 but transmits signals to the base station 8 via transponder unit 5. In this alternative embodiment, with reference to the example described above, the cordless phone 1 contains GSM as well as DECT technology.

Referring to Fig 2, when DECT and GSM technology are used within the mobile communication system shown in Fig 1, the mobile transponder unit incorporates a DECT transmitter/receiver 9 and a GSM transmitter/receiver 12. The DECT transmitter/receiver 9 communicates with the cordless phone (item 1 in Fig 1) via antenna 4; whereas, the GSM transmitter/receiver 12 communicates with the local base station (item 8 in Fig 1) via antenna 6. Voice and/or data signals 13 are passed between the DECT and GSM transmitter/receiver modules (items 9 and 12, respectively) via the DECT/GSM interface 11, all powered by rechargeable battery 10.

The DECT standard specification includes an interface with GSM, making the DECT/GSM interface 11 within the mobile transponder (item 5 in Fig 1) straightforward. Also, use of the DECT standard allows the cordless phone 1 to selectively communicate via a cordless base station (not shown) connected via local-loop landline to the Public Switched Telephone Network (PSTN). For example, the cordless phone 1 and mobile transponder 5 (both shown in Fig 1) might each have respective docking slots within a common battery charger unit (not shown)

incorporating a PSTN interface. In the future, this approach has the potential to provide a single personal contact telephone number for the user, via local-loop landline or the cellular network, depending on the detected location of the cordless phone.

Referring to Figs 1 and 2, when switched on, the cordless phone 1 sends out an intermittent control signal to DECT transmitter/receiver 9, causing the mobile transponder unit 5 to power up and return an acknowledgement signal indicated by a flashing LED (not shown) on the cordless phone 1. In the event of the transponder 5 being out of range of phone 1, then the LED will not flash. On the other hand, if the mobile transponder 5 does not receive the described control signal from cordless phone 1, the GSM transmitter/receiver 12 will power down. Both the cordless phone 1 and mobile transponder 5 are customised via the use of matched smart cards, to allow system specific encrypted communication..

A normal cordless phone based on DECT technology has an indoor range of 10-50 metres and an outdoor range of up to 300 metres, which involves a higher power level for communication signal 3 (in Fig 1) than is strictly necessary to realise a practical embodiment of the present invention. For example, a radio signal range of say 10 metres would be adequate for most applications, which is typically used at the physical level of the Bluetooth Specification for wireless communications (operating in the ISM band at 2.4 GHz). Bluetooth is already used by at least one mobile phone manufacturer to communicate with a hands free microphone headset, providing Bluetooth/GSM communication via existing technology.

Both the DECT and GSM standards make use of TDMA (Time Division Multiple Access) digital radio technology, as do the D-AMPS and PDC standards which provide further alternative options for use within the mobile communication system. Also, analogue embodiments of the present invention are possible, for example, based on the AMPS, ETACS, or, NMT standards which remain in use in some geographical areas.

At the present time, a new range of infrastructure and handsets based on so-called Third Generation (3G) systems are being developed to provide enhanced communications within cellular networks. Wireless technologies such as EDGE, GPRS and W-CDMA followed by the evolution of UMTS thus provide further future options for inclusion within the described mobile communication system.

Referring again to Fig 1, the use of different communication standards for the cordless phone/mobile transponder signal 3 and the mobile transponder/GSM base station signal 7 allow the mobile communication system to work within existing cellular phone networks. On the other hand, if GSM technology was used throughout: to avoid interference, the cellular network would need to allocate 4 rather than 2 GSM channels to the system, namely 2 channels for send/receive signals 7 (as at present) plus 2 further send/receive channels for signals 3. The use of the DECT standard for signals 3 is also preferable from another viewpoint, namely, DECT has been optimised for short-range communication; whereas, standards such as GSM have had different development objectives associated with higher range cellular networks.

Due to the much lower radiation levels associated with cordless phones, practical embodiments of the mobile communication system described above are likely to reduce the level of radiation to the user's head by as much as 80-90% compared to use of a typical mobile phone. However, to avoid exposing other parts of the body to high radiation levels, it is preferable that the mobile transponder is not carried in close contact with the user's body. As previously indicated, the mobile transponder should ideally be carried in say a handbag or briefcase, even during standby mode, when the transponder will still be in communication with the local base station. Nevertheless, there may be occasions when the transponder needs to be directly carried in perhaps a belt case and, to provide some degree of protection to the body, a suitable antenna radiation shield may be incorporated, as shown in Figs 3, 4 and 5.

Referring to Figs 3, 4 and 5, the GSM antenna 6 is located in an external slot 16 in the moulded plastic case 17, the latter also containing the necessary DECT and GSM electronics. A suitable radiation shield 14 is incorporated into the back of plastic case 17, for example, the radiation shield 14 might comprise a wire mesh based on the "Faraday cage" principle. Referring specifically to Fig 3, the radiation shield 14 extends beyond the plan view periphery of antenna 6 in order to minimise the radiation passing perpendicular to the plane of the shield 14. Referring to Figs 4 and 5, the position of the rechargeable battery 10 means that any radiation passing through shield 14 tends to be absorbed by battery 10. It is self evident from the foregoing that for this method of radiation protection to be effective, the battery 10 will need to be closest to the user's body. In other words, if a belt case is used to carry the mobile transponder, the unit will need to be inserted in the case with the antenna 6 facing away from the user's body.

Referring to Fig 5, the antenna 6 has a hinge 18 and the slot 16 has a finger grip area 19 to allow the antenna 6 to be moved into a position at a right angle to the plastic case 17. Particularly in areas of poor reception, the mobile transponder can be laid flat on a horizontal surface and the antenna 6 moved as described to improve the quality of radio transmission. In addition, the antenna might be provided with a telescopic extension (not shown).

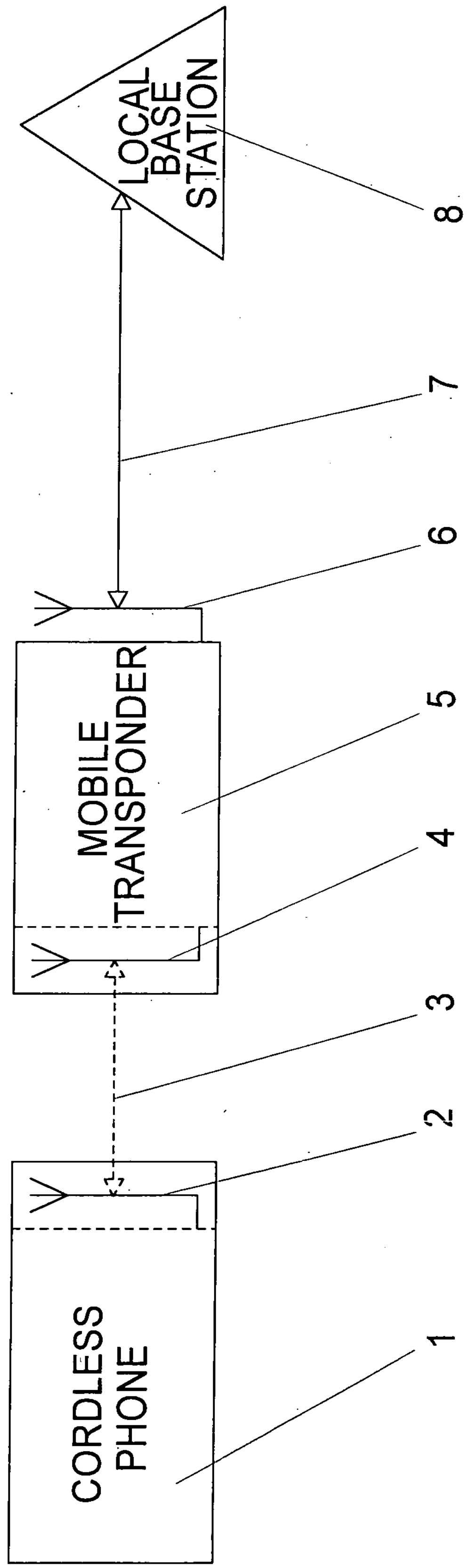
LOCAL
BASE
STATION
8
7
6
MOBILE
TRANSPONDER
5
4
3
2
CORDLESS
PHONE
1

Fig 1

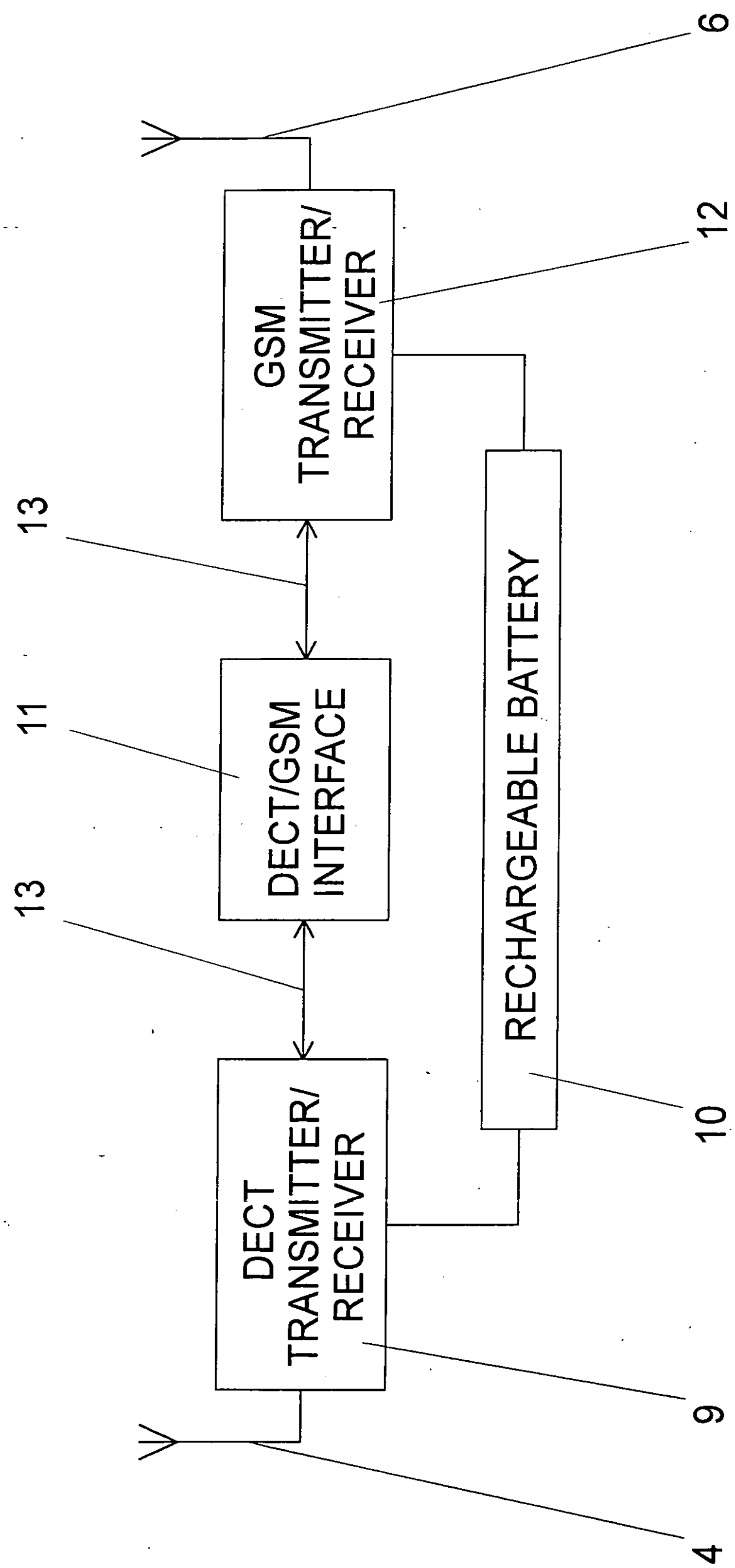
GSM TRANSMITTER/ RECEIVER
DECT/GSM INTERFACE
DECT TRANSMITTER/ RECEIVER
RECHARGEABLE BATTERY
6
12
13
11
13
10
9
4

Fig 2

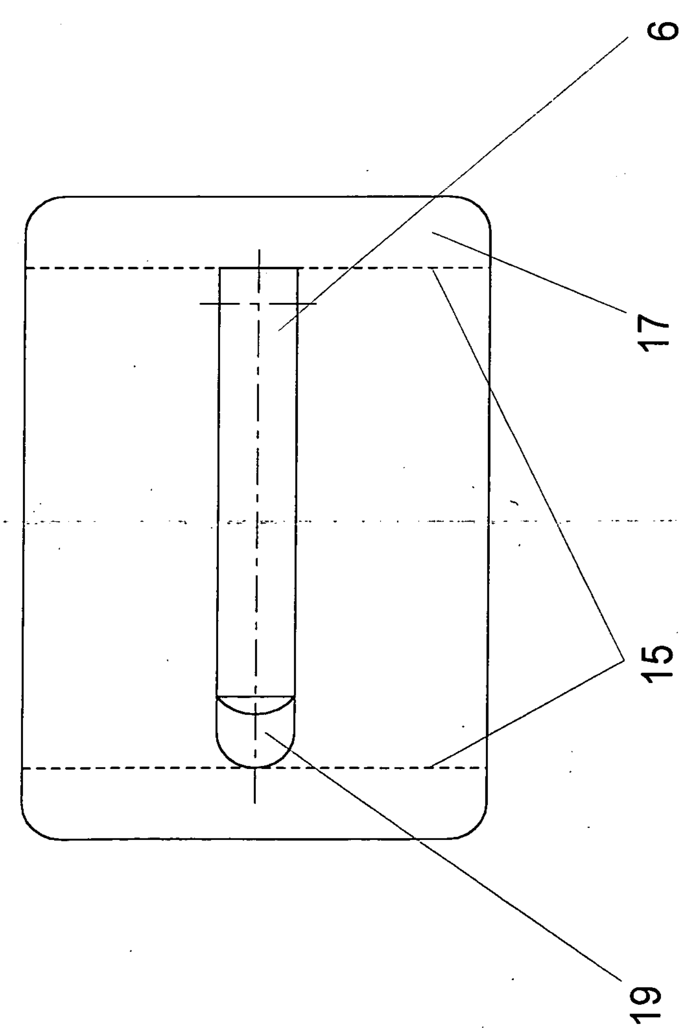

Fig 3

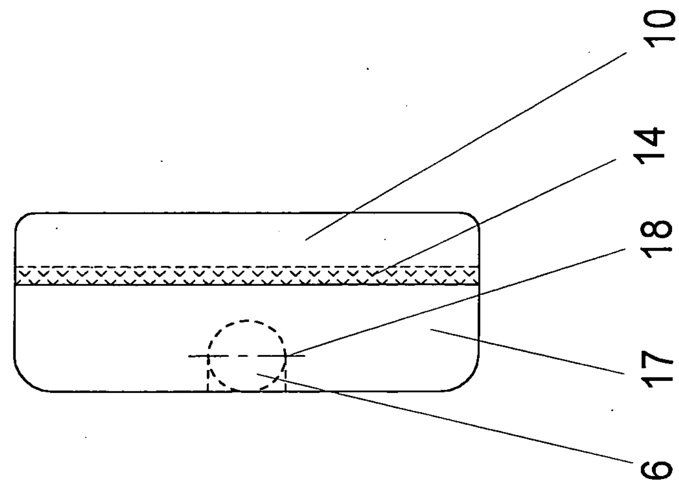

Fig 4

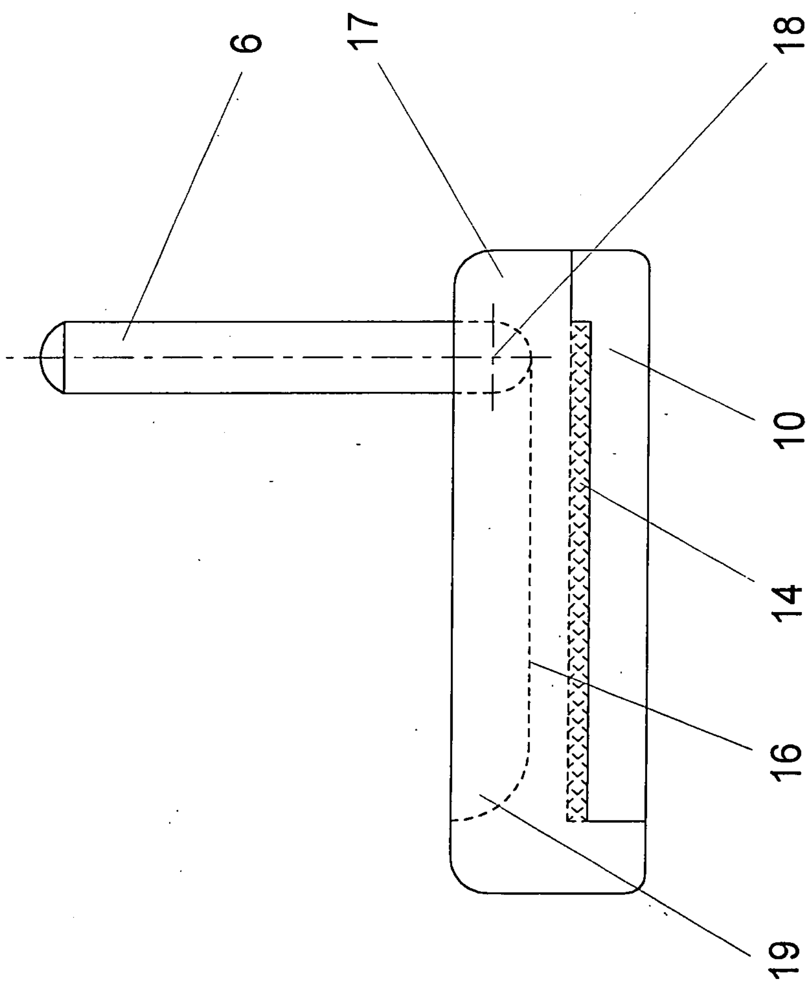

Fig 5